Superfund Program
Proposed Plan

U.S. Environmental Protection
Agency, Region 2

Diamond Head Oil Refinery Superfund Site
Kearny, New Jersey

July 2009

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan identifies the preferred alternative for an Early Action to address the light nonaqueous phase liquid (LNAPL) source area at the Diamond Head Oil Refinery site, and provides the rationale for that preference. For this action, also referred to as Operable Unit 1 (OU1), EPA is recommending construction of an on-site biocell to facilitate the biodegradation of the LNAPL source area. Not all the wastes are expected to be effectively treated within the biocell, so this Early Action also includes the excavation and off-site disposal of the more highly contaminated material within the LNAPL source area. This action would be taken while remedial investigations to determine the full nature and extent of contamination for the site are completed.

This proposed plan summarizes the data considered in making this early action recommendation. This document is issued by EPA, the lead agency for site activities. EPA, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency for site activities, will select the final OU1 remedy after reviewing and considering all information submitted during a 30-day public comment period. EPA, in consultation with NJDEP, may modify the preferred alternative or select another response action presented in this Proposed Plan based on new information or public comments. Therefore, the public is encouraged to review and comment on all the information presented in this Proposed Plan.

MARK YOUR CALENDAR

PUBLIC COMMENT PERIOD:
July 14, 2009 - August 12, 2009, U.S. EPA will accept written comments on the Proposed Plan during the public comment period.

PUBLIC MEETING:
July 22, 2009 at 6:00 P.M.
U.S. EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at the main council chambers in Town Hall, 402 Kearny Avenue, Kearny, New Jersey.

For more information, see the Administrative Record at the following locations:

U.S. EPA Records Center, Region II
290 Broadway, 18th Floor
New York, New York 10007-1866
(212-637-4308)
Hours: Monday-Friday – 9 A.M. to 5 P.M.

Kearny Public Library
318 Kearny Avenue
Kearny, New Jersey 07032
(201-998-2666)

EPA is issuing this Proposed Plan as part of its community relations program under Section 117(a) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, or Superfund), and Sections 300.430 (f) and 300.435(c) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This Proposed Plan summarizes information that can be found in greater detail in several reports, included in the Administrative Record, in particular, the June 2009 report *Operable Unit 1 Focused Feasibility Study for the LNAPL Source Area* (FFS Report). EPA and NJDEP encourage the public to review these documents to gain a more comprehensive understanding of the site and Superfund activities that have been conducted there.

SITE DESCRIPTION

The Diamond Head site, listed as 1401 Harrison Avenue, Kearny, New Jersey, is characterized by contamination from a former oil reprocessing facility located near the Hackensack Meadowlands. Figure 1 shows the site location. The site is comprised of a 15-acre unoccupied parcel that includes wetland areas and drainage ditches, a small wetland/pond, a vegetated landfill area along the western border, and the remnants of the former Diamond Head Oil Refinery on the eastern portion of the site. The parcel is bordered by Harrison Avenue (also called the Newark Turnpike) to the north, entrance ramp "M" of Interstate 280 (I-280) to the east, I-280 to the south, and Campbell Distribution Foundry to the west.

The land use surrounding the site is industrial or open space/wetlands; the nearest residential area is a half-mile to the west. To the south, a Municipal Sanitary Landfill Authority (MSLA) landfill, identified as the 1-D Landfill, is situated south of I-280.

The 15-acre parcel is fenced. The prior site operations took place on the eastern half of the parcel; the landfilled area was once an access road to the 1-D Landfill, and a landfill mound remains from those activities that rises 10 to 15 feet above the rest of the site. Surface water drains through a drainage ditch that eventually discharges to Frank's Creek, which in turn discharges to the Passaic River.

SITE HISTORY

The oil reprocessing facility operated under several company names, including PSC Resources, Inc., Ag-Met Oil Service, Inc., and Newtown Refining Corporation, from 1946 to early 1979. All of these companies were owned by Mr. Robert Mahler. During facility operations, multiple aboveground storage tanks and possibly subsurface pits were used to store oily wastes. These wastes were intermittently discharged directly to adjacent properties to the east and the wetland area on the south side of the site, creating an "Oil Lake."

In 1976, the New Jersey Department of Transportation (NJDOT) purchased several lots from PSC Resources, Inc., as part of its plans for construction of I-280. In 1977, NJDOT removed over 10 million gallons of oil and oil-contaminated liquid and over 230,000 cubic yards of oily sludge from the area of the Oil Lake. The liquid wastes were shipped to waste-oil recycling facilities. The oil-contaminated sludges from the bottom of the Oil Lake were excavated and placed in a series of disposal cells, one atop the MSLA 1-D Landfill, and a series of smaller cells within the right-of-way (ROW) to the highway, next to the then still-operating oil-reprocessing facility. The details of these disposal efforts are not well documented, but a simple liner and a clay-based capping material were to be part of the disposal efforts for the sludges.

While the surficial Oil Lake was removed and filled, the NJDOT also reported finding an "underground lake" of oil-contaminated groundwater extending from the eastern limits of the I-280 right-of-way to Frank's Creek, west of the site.

From the close of operations in 1979 until 1982, the abandoned site was not completely fenced. In 1982, during the dismantling of the oil reprocessing facility, approximately 7,500 gallons of materials were apparently pumped out of the tanks and disposed off site, and 27 tons of contaminated soil were reportedly removed from the site. It was sampling undertaken during this cleanup effort that first identified hazardous substances, including polychlorinated biphenyls (PCBs) in waste material collected from the site. Aerial photographs from 1982 show that the oil reprocessing facility infrastructure had been dismantled. The buildings and facilities associated with previous site operations were constructed on the eastern half of the site, and some remnant concrete building and tank foundations remain. In 1985, the refinery property was sold to Mimi Urban Development Corporation, which subsequently changed its name to Hudson Meadows Urban Development Corporation.

The property sat idle for a number of years, at least in part because of the alleged contamination. EPA was asked by NJDEP to evaluate the site for inclusion on the National Priorities List (NPL) in 1999. The site was added to the NPL of Superfund sites in September 2002.

In 2002, EPA began a remedial investigation (RI) to determine the nature and extent of the problems posed by the site. In addition to the LNAPL findings discussed below, the RI found soil, groundwater, sediment and surface water contamination attributable to the site. The RI also included a number of test trenches through the landfill portion of the site to assess the nature of the material buried there, and has collected borings along the I-280 ROW berms to confirm the presence of the buried sludges. Site studies are ongoing; for example, new groundwater monitoring wells were installed earlier in 2009 on a number of neighboring properties to fully assess the extent of the groundwater problems posed by the site. Field investigations for the comprehensive remedial investigation of the site are expected to be complete in 2010, at which time EPA can proceed with evaluating remedial alternatives for the entire site.

SITE CHARACTERISTICS

Site Hydrology

The nearest surface water body is Frank's Creek, and as a result of I-280's construction, all drainage on the north side of the highway now travels by a man-made drainage swale, a distance of about 600 feet to the creek, which in turn discharges to the Passaic River. Prior to the 1940s, the area south of Harrison Avenue was wetland. Landfilling activities that started in the 1940s began to shrink and divide the wetland areas, and the eventual Oil Lake, estimated in 1977 at between six and seven acres, appears to have formed in a remaining lowland area surrounded by properties filled for industrial development and by what would become the MSLA 1-D Landfill. With the construction of I-280, including the placement of the ROW berms, an isolated wetland, frequently ponded, remains just south of the former Diamond Head Oil facility.

Two factors have a significant influence on the water table at the site. The first is the presence of wetlands along the southern site boundary that include areas of surface water, and the second is the presence of an LNAPL plume in the southeast corner of the site in the area of the former lagoon. Although lighter than water, the density of the LNAPL has the effect of depressing the water table and influencing groundwater flow. Excepting these areas, groundwater is first encountered at the site under unconfined conditions at a depth of one to two feet below the ground surface.

Site Hydrogeology

The stratigraphy at the site consists of a relatively uniform vertical sequence of unconsolidated materials as follows, from top to bottom:

- A highly variable (in content and thickness) layer of anthropogenic fill across the site, consisting of typical demolition-type debris, including wood, brick, metal, glass, plastic and concrete mixed in a matrix of poorly sorted fine to coarse sand and gravel or silt, sand, and gravel.

- A sand unit about five feet thick on the western side of the site and pinching out until it is not present on the eastern side of the site.

- A silty clay unit, up to eight feet thick in sections of the site, that appears to be continuous throughout the study area.

- A distinctive peat layer of varying thickness but considered continuous across the site.
- A silt and sand unit approximately 15 to 20 feet thick beneath the peat.
- Laminated silt and clay unit, the full thickness of which was not observed in any of the study borings to date (as deep as 50 feet).
- Bedrock, which also has not been encountered to date.

Shallow groundwater flow direction above the silty clay and peat layers is consistent with surface water flow directions, to the south and west. In the waterbearing unit below the peat, groundwater flows from northeast to southwest, consistent with regional trends in groundwater flow.

The ongoing RI studies will result in a more comprehensive understanding of stratigraphy and groundwater.

Nature and Extent of LNAPL Source Material

The RI studies to date have outlined two areas as potential source areas where LNAPL may be continuing to release contamination to the environment:

- the former oil reprocessing section of the site, once containing two buildings, multiple aboveground storage tanks (ASTs), drum storage areas, and possibly underground pits; and
- remnants of the Oil Lake, estimated in 1977 to cover an area of six to seven acres, located over the southern section of the site and extending outside the site's fenced boundaries to the east and south.

Currently, in the oil processing section of the site, only the foundations of one building and two ASTs are visible. No remnants of the Oil Lake are visible, but historical information shows that the lagoon occupied the southeastern section of the site and extended eastward. Figure 2 shows the boundary of the Oil Lake compiled from historical aerials of the site.

There is evidence of oil contamination in nearly every boring installed within the 15-acre fenced property and in many borings to the southeast. Because of this "smear" of oil contamination across the site, the RI studies performed to date have used the following methods to document the nature and extent of the LNAPL, and to identify the more severely contaminated areas of the site:

- A geotechnical measurement tool called laser-induced fluorescence (LIF) allowed for the subsurface mapping of borings that contain LNAPL. LIF can rapidly identify an oil "fingerprint," including both extent and relative concentration.
- Soil borings were collected throughout the site down to the laminated silt and sand unit, as much as 50 feet deep, and the presence of oil staining or separate-phase oil in the soil borings was documented. These results were compared with the LIF sample points to calibrate the LIF data to site-specific conditions.
- A number of monitoring wells, meant to measure groundwater contamination, have thicknesses of floating product in the tops of the wells, with as much as five feet of LNAPL floating in some wells.
- Samples were collected of contaminated soil and oily wastes and sludges and sent for laboratory analysis to identify potential contaminants of concern and to establish an analytical profile of the LNAPL.

Using these methods, several characteristics of the LNAPL were established:

- The LIF study concluded that LNAPL is present in the subsurface throughout most of the investigated area, though the LIF showed wide variations in the intensity of the LNAPL signal, indicating substantial variation in concentration across the site.

- LNAPL was measured in wells in three areas of the site, one in the former process area, and two within the footprint of the Oil Lake. These areas are identified on Figure 2.
- The vertical occurrence of LNAPL can be further separated into two depth intervals: (1) at the water table (approximately two feet below ground surface), sometimes with an extended smear zone into the saturated fill-containing material and soil to about 10 feet below ground surface; and (2) as a distinct deeper interval at depths of 10 to 16 feet below ground surface within the silty/clayey soil. The bulk of LNAPL-containing soil is located near the water table within the fill layer.
- LNAPL appears to contain more diesel range organics than gasoline range organics. The following compounds or classes of compounds were detected in the LNAPL: benzene, toluene, ethylbenzene, and xylenes, as well as a number of other volatile and semivolatile organic compounds (VOCs and SVOCs) consistent with a petroleum matrix. In addition, two PCBs (Arochlor-1232 and Arochlor-1260) and a variety of metals, including lead and cyanide were also identified in LNAPL-zone samples.
- Despite the large thickness of LNAPL found in some monitoring wells and its relatively high saturation, LNAPL is extremely viscous and is relatively immobile under ambient gradients. This is indicative of a highly weathered LNAPL, where much of the more mobile components of the site releases have degraded or already traveled away from the site, leaving the less mobile fractions.
- Within LNAPL, there are pockets of less weathered LNAPL of high saturation that present a leaching concern to groundwater. These are LNAPL areas that may be considered to present a risk for leaching contaminants to groundwater.

Principal Threat Evaluation of LNAPL

Based on the LNAPL studies performed to date, portions of the LNAPL are more mobile, are likely to have a higher toxicity, and are at a much greater concentration at the site. These high-level wastes form the "principal threat" posed by the site. Having developed an understanding of the nature and extent of the LNAPL, the RI studies further identified characteristics for the principal threat LNAPL, consistent with EPA guidance.

EPA defines principle threat wastes as "those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids or other highly mobile materials (e.g., solvents) or materials that have high concentrations of toxic compounds." By contrast, low-level threat wastes are defined as "those materials that generally can be reliably contained and that would represent a low risk in the event of a release. They include materials that exhibit low toxicity, low mobility in the environment, or are near health-based levels."

The following lines of evidence based on site-specific data were used to interpret whether the LNAPL source material at the Diamond Head site represents a principal and/or a low level threat:

- Assessment of the presence of LNAPL in the soil column through soil borings and interpretation of LIF results, placing particular emphasis on LNAPL found at or near the ground surface and, therefore, posing a direct-contact threat;
- Comparison of LIF results to areas where LNAPL was visually observed in the pore spaces of soil cores collected from soil borings, and to groundwater data to indicate where the highest mass of wastes were located, and where those high-concentration

wastes were associated with elevated groundwater concentrations; and

- Areas where a measureable thickness of LNAPL was found in monitoring wells and piezometers during RI studies.

Using these lines of evidence, LNAPL detected at the site was separated into areas where LNAPL material is considered to represent a principal threat, and areas where LNAPL can be considered to represent a lower-level threat, and for which appropriate measures will be considered during future feasibility studies. Figure 2 shows the areas identified as a principal threat using these lines of evidence (shaded in orange). The total area is roughly 176,000 square feet. This area includes the two areas of the site where monitoring wells contain measurable thicknesses of LNAPL (shaded in yellow). The thicknesses of the principal threat LNAPL varies. Based on an average depth of seven feet below ground surface, a volume of 45,825 cubic yards, including 2,593 cubic yards where LNAPL floating product is found in wells, constitutes the principal threat LNAPL (outlined in red on Figure 2).

A noncontiguous area within cloverleaf of I-280 (also identified on Figure 2) appears to meet some of the characteristics of a principal threat as described in the FFS, but it is not as near the surface, and groundwater contamination is not as clearly attributable to this area. This area is not included within the definition of a principal threat for this Early Action; further studies of this area will be carried out as part of the site-wide RI.

While further studies of the landfilled area of the site are required, the history of site activities and the test trenches already installed support EPA's conclusion that the landfill is not a source of LNAPL. EPA will further evaluate the landfill as part of a site-wide RI.

SCOPE AND ROLE OF ACTION

In order to remediate Superfund sites, work is often divided into remedial phases, also referred to as operable units. This first operable unit has been identified as an early action to address the principal threat LNAPL. A second operable unit will address residual soil contamination attributable to the site including lower-level threat LNAPL, the on-site landfilled area, the ROW berms, and groundwater and sediment contamination.

ENFORCEMENT

Diamond Head Oil Refinery, Inc., and its affiliated companies are no longer in business. Hudson Meadows Urban Development Corporation (HMUDC) is the land owner for the former Diamond Head Oil facility, and Kearny Township and NJDOT retain ownership to the remaining land associated with the site. At the start of the RI/FS, EPA concluded that HMUDC was not capable of funding the cost of the necessary studies; the RI/FS has been federally funded.

SUMMARY OF RISKS ATTRIBUTABLE TO LNAPL SOURCE AREAS

The focus of this Early Action is to address light nonaqueous phase liquid (LNAPL) that constitutes a principal threat at the site. The principal threat LNAPL is physically similar to free oil product. Oil products are toxic to ecological receptors and humans through direct contact, incidental ingestion, and inhalation pathways. Potential exposure to ecological receptors and humans from the high-concentration LNAPL that is present at the site could result in adverse health effects. It is, therefore, important that steps be taken to reduce or eliminate the volume of LNAPL present at the site. Reducing or eliminating the LNAPL at the site would reduce potential exposure to free product and is an important early step in managing the site risks; however, it is not expected to eliminate the overall risks and hazards to ecological receptors or humans because of residual contamination that would remain on the site. This residual contamination will be addressed in subsequent actions and will be accompanied by full ecological and human health risk assessments.

In addition to removing the potential exposure to LNAPL at the site, reducing or eliminating the LNAPL would also limit its potential migration, which would aid in investigating and selecting a remedy for the remainder of the site.

A list of chemicals of potential concern identified to date can be found in Table 1. Further information about the nature and extent of contamination found at the site is included in the Administrative Record.

Based upon the results of the site studies to date, EPA has determined that actual or threatened releases of hazardous substances from the site, if not addressed by the preferred remedy or one of the other active measures considered, may present a current or potential threat to human health and the environment.

REMEDIAL ACTION OBJECTIVES

The following remedial action objectives for the principal threat LNAPL wastes address the human health risks and environmental concerns at the Diamond Head Oil site:

- Remove or treat principal threats, consistent with the NCP, to the extent practicable;
- Prevent current and future migration of LNAPL and associated chemical contaminants to the various media at the site including groundwater and seeps to surface water; and
- Prevent human exposure through direct contact with the principal threat LNAPL.

The first two RAOs are intended to address the principal threat LNAPL and the contamination that may be released from this material. The third RAO is intended to address risks to potential future site workers/users as a result of exposures to this material.

This proposed action would address the principal threat wastes that have been identified to date at the site, thereby addressing the most highly contaminated material that, without early attention, would result in ongoing contamination of currently uncontaminated areas. The RAOs would be achieved by attaining the remediation goals of no measurable thickness of LNAPL in monitoring wells, and no potential for LNAPL-contaminated soil to leach oil and grease to groundwater, as measured by a synthetic precipitate leachate procedure (SPLP) leaching test. Because there are no Federal or State cleanup standards for LNAPL, EPA established these remediation goals based upon the toxicity and mobility and the principal threats to address this continuing source.

SUMMARY OF REMEDIAL ALTERNATIVES

The RAOs identified above are primarily focused on addressing the LNAPL mass and do not specifically address the co-located chemical contamination in soil at the site. Some, though not all of this chemical contamination is associated with LNAPL; therefore, by reducing the mass of LNAPL, the Early Action would also reduce some of the co-located chemical contamination and the unacceptable risks to potential human and ecological receptors associated with both the LNAPL and co-located chemical contamination at the site.

While the effects of the selected technologies on the co-located chemical contamination cannot be quantified at this time, the effectiveness of each alternative is presented in terms of LNAPL source reduction and the technology's potential to reduce concentrations of other chemicals present at the site.

The principal threat LNAPL to be addressed by this proposed action encompasses two areas (outlined in red in Figure 2), and identified in the FFS report as the "remedial target area." The thickness of the principal threat LNAPL varies from between six and 12 feet, and at its deepest, appears to have penetrated as much as six inches into the silty/clay layer that underlies the site. The total volume of these areas was estimated in the FFS at 45,825 cubic yards.

The RI included several treatability studies of technologies that are commonly used for petroleum-based LNAPL: *in-situ* air sparging and LNAPL pumping. For both technologies, the viscosity of the LNAPL was an impediment to successful performance. Consequently, neither of these technologies was carried forward in the FFS, although the biodegradation treatment process at work in air sparging is present in Alternative 2.

Detailed descriptions of the remedial alternatives can be found in the FFS report. The alternatives are:

Alternative 1: No Action

Capital Cost:	$0
Annual O&M Cost:	$0
Present-Worth Cost:	$0
Construction Time:	NA

The Superfund program requires that the "no-action" alternative be considered as a baseline for comparison with the other alternatives. The no further action alternative does not include any physical remedial measures (beyond those response actions already completed) that address the LNAPL contamination at the site.

Because this alternative would result in contaminants remaining on site above health-based levels, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Alternative 2: On-Site Biocell

Capital Cost:	$16,080,000
Annual Biocell Operations Cost:	$207,000
Annual operation and maintenance (O&M) Costs:	$0
Present-Worth Cost:	$17,340,000
Construction Time:	1 year
Remediation Time:	5 years

Under this alternative, the remedial target areas would be isolated with a sheet pile wall, and the principal threat LNAPL areas excavated. Some of this material, as discussed more fully below, would be removed for off-site disposal. The remaining excavated material would be augmented with nutrients and bulking agents to enhance permeability and the conditions for biological activity. The area within the sheet pile walls would be converted into a biocell by installing piping to supply air and distribute nutrient additives, along with a collection system for air and water that may accumulate in the biocell. The augmented LNAPL material would then be placed in the biocell for treatment, and capped.

The biocell would require continued operation of the aeration, nutrient distribution, and water collection systems, including collecting and treating water accumulated in the biocell, and maintenance of the cover, until the remediation goals are achieved. The FFS describes performance sampling and final confirmation sampling that would be required to demonstrate that the LNAPL wastes have been destroyed through biological degradation, at which time, the biocell components would be dismantled. The FFS estimates that the biocell would require five years to achieve the remediation goals.

Areas where a measureable layer of floating LNAPL product is found in monitoring wells may not be amenable to effect treatment in the biocell, or may extend the time frame required for treatment beyond the projected five-year time period. Under this alternative, these areas would be excavated and transported for off-site disposal. These highly contaminated soils and sludges may need treatment via stabilization to allow for transportation. The quantity of material that would not be suitable for the biocell cannot be determined until remedial design; for cost-estimating purposes, the FFS assumed, at minimum, that the floating product area, approximately 2,600 cubic yards of the 45,825 cubic yards within the remedial target areas, would be disposed of in this fashion. Although additional treatability work during remedial design will refine the amount of material to be shipped off site for disposal, the volume could be much larger than 2,600 cubic yards; the effectiveness of the process in achieving cleanup goals within given time periods will be a major factor in this determination. For example, removing a larger volume of material for off-site disposal may reduce the time to meet cleanup goals and enable more rapid reuse of the site.

While this alternative would result in contaminants remaining within the remedial target areas above health-based levels, the action is expected to address the principal threat LNAPL as a final action. A subsequent Record of Decision will be required to make a final determination about the underlying constituents that would remain within the treated soil; therefore, the need for a review of the site every five years, as required by CERCLA if contaminants remain above health-based levels, would be made at that time. If justified by the RI/FS, remedial actions may be implemented to remove or treat such wastes.

Alternative 3: On-Site Soil Washing

Capital Cost:	$18,560,000
Annual O&M Costs:	$0
Present-Worth Cost:	$18,560,000
Construction Time:	1 year

Under this alternative, the remedial target areas would be isolated with a sheet pile wall, and the principal threat LNAPL areas excavated. The excavated material would then be treated on site using soil washing. The excavated soils and LNAPL wastes would be placed in a slurry reactor vessel and combined with a washing fluid, a combination of water, surfactants and co-solvents that would "wash" (desorb or dissolve) the LNAPL from the soil particles. This technology requires a water treatment facility to treat the LNAPL and contaminants of concern in the washing fluid so it can be reused. The separated wastes from soil washing would be taken off site for further treatment and disposal. The treated soil material would be tested for compliance with the cleanup goals, and returned to the excavated areas.

The FFS describes confirmation sampling required to demonstrate that the LNAPL wastes have been removed from the treated soils prior to returning the material to the excavation. The FFS estimates that soil washing could be implemented in approximately one year.

As with Alternative 2, areas where a measureable layer of floating LNAPL product is found in monitoring wells may not be amenable to soil washing, and this alternative assumes that these areas would be excavated, treated as necessary, and transported for off-site disposal. For cost-estimating purposes, the FFS assumed that, at minimum, the floating product area would be addressed in this fashion.

While this alternative would result in contaminants remaining within the remedial target areas above health-based levels, the action is expected to address the principal threat LNAPL as a final action. A subsequent Record of Decision will be required to make a final determination about the underlying constituents that would remain within the treated soil; therefore, the need for a review of the site every five years, as required by CERCLA if contaminants remain above health-based levels, would be made at that time. If justified by the RI/FS, additional remedial actions may be implemented to remove or treat such wastes.

Alternative 4: Excavation and Off-Site Treatment/Disposal

Capital Cost:	$19,450,000
Annual O&M Costs:	$0
Present-Worth Cost:	$19,450,000
Construction Time:	1 year

Under this alternative, the remedial target areas would be isolated with a sheet pile wall, and the principal threat LNAPL areas excavated. As with Alternatives 2 and 3, dewatering would be required prior to excavation, and the removed water would need to be treated prior to discharge. The excavated material would then be stabilized on site to allow for transportation for off-site disposal. The excavated areas would be backfilled with clean fill.

Sampling would be performed during remedial design to delineate the extent of the remedial target areas, but no performance monitoring would be required. The FFS estimates that this alternative could be implemented in approximately one year.

Because this alternative would create a "clean island" in the center of the site, the sheet pile wall would be left in place at the end of the action. The excavated area would be graded to create a recharge area that would maintain a positive gradient from within the sheet piled areas to the outside to prevent recontamination of the area by other contaminants of concern.

This alternative would not result in contaminants remaining within the remedial target areas above health-based levels, as any underlying constituents within the excavated area would also be removed. A subsequent Record of Decision will still be required to make a final determination about the need for five-year reviews for other areas of the site.

EVALUATION OF ALTERNATIVES

Nine criteria are used to evaluate the different remediation alternatives individually and against each other in order to select a remedy, (see Table above, "Evaluation Criteria for Superfund Remedial Alternatives"). This section of the Proposed Plan profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed above. The "Detailed Analysis of Alternatives" can be found in the FFS.

1. **Overall Protection of Human Health and the Environment**

Given the limited scope of this early action, the remedial action objectives only consider protectiveness of actions to address the principal threat LNAPL. Site-wide protectiveness will be considered in a subsequent decision document. The no action alternative is not considered protective because it does nothing to mitigate the LNAPL as a continuing source of contamination or as a direct contact threat.

Alternative 1, the "No Action" alternative, is not protective of human health and the environment. The remaining alternatives are considered protective, because they remove the LNAPL through treatment or off-site disposal.

2. **Compliance with ARARs**

Alternatives 2, 3 and 4 are expected to satisfy applicable or relevant and appropriate requirements (ARARs) that pertain to the

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES
Overall Protectiveness of Human Health and the Environment evaluates whether and how an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.
Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that are legally applicable, or relevant and appropriate to the site, or whether a waiver is justified.
Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.
Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present.
Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.
Implementability considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.
Cost includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.
State/Support Agency Acceptance considers whether the State agrees with the EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.
Community Acceptance considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

principal threat LNAPL and comply with the substantive requirements of the applicable laws and regulations. EPA has developed site-specific remediation goals that are consistent with the expectations of the New Jersey Technical Requirements for the remediation of free product (N.J.A.C 7:26E-1). The Resource Conservation and Recovery Act (RCRA), 40 CFR 261, is applicable for assessing the disposal requirements of potentially hazardous solid wastes, such as the LNAPL-contaminated soils. Based upon the available documentation, EPA has concluded that the LNAPL wastes are not listed hazardous waste, nor do they exhibit hazardous characteristics; therefore, they do not require treatment to meet RCRA Land Disposal Restrictions.

It should be noted that the active alternatives require the disturbance of the on-site wetlands. Restoration of the wetlands is not included in these alternatives, as a significant full-scale remediation effort is expected to follow this Early Action. Therefore, wetland restoration will need to be considered as part of the overall remedial action for the site.

3. Long-term Effectiveness and Permanence

The No Action alternative offers no long-term effectiveness or permanence. For Alternatives 2 and 3, the potential risks from the principal threat LNAPL would be reduced, although both alternatives can be expected to leave some residual LNAPL in the remedial target areas. Alternative 4 eliminates principal threat LNAPL within the remedial target areas. As discussed earlier, this action only addresses LNAPL that is considered a principal threat; under all the active alternatives, lower-level threat LNAPL would remain on other areas of the site.

Other than water from biocell dewatering during operation, no treatment residuals are expected from Alternative 2. Treatment residuals, in addition to water from dewatering, are expected from Alternative 3; the concentrations of principal threat LNAPL and associated contaminants are expected to be high in these residuals (e.g., filter cake and blowdown water from soil washing). The residuals from Alternative 3 are assumed to require off-site treatment and disposal. There are no treatment residuals for Alternative 4, as this alternative involves the excavation and off-site disposal of all the waste.

For Alternatives 2 and 3, at the end of the implementation period, an isolation barrier would not be needed around the treated soil, as the treated soil is expected to be of similar characteristics to the surrounding soil, including some residual LNAPL and some underlying constituents that would not be treated.

Under Alternative 4, an isolation barrier around the perimeter of the remedial target areas would need to be maintained between the new backfill and the surrounding soil. This isolation barrier would be needed as the remediated area is expected to contain no LNAPL and no other contaminants compared to the surrounding soil. The surface would need to be graded to drain clean surface water toward remediated soil such that there is a slight positive gradient from within the remedial target areas to the outside. Thus, while Alternative 4 provides more long-term permanence by addressing all the LNAPL and all the underlying constituents not treated by Alternatives 2 and 3, it achieves a level of remediation - a "clean island" in the middle of still-contaminated soils - that requires more rigorous efforts to maintain.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants Through Treatment

Alternative 1 provides no reduction in toxicity, mobility or volume. Alternatives 2 and 3 would reduce the toxicity, mobility and volume of the contaminants in the remedial target areas through treatment. For Alternatives 2 and 3, the treatment is permanent.

Alternative 4 does not use treatment – rather, the toxicity and volume are transferred from the site through off-site disposal.

5. Short-term Effectiveness

There are no short-term effectiveness issues associated with the No Action alternative. Alternatives 2, 3 and 4 would present some short-term risks to the community (dust, emissions, soil erosion); however, these risks can be controlled through engineering controls. Risks to workers during implementation also can be controlled through safety procedures and the use of personal protection. As noted earlier in this Proposed Plan, there are no residences within half a mile of the site. Short-term concerns would relate to any potential impacts on industrial and commercial neighbors.

All of the alternatives involve excavation. Risks to commercial and industrial neighbors can be controlled through engineering controls such as soil erosion controls, dust suppressants, and the implementation of spill prevention and response procedures. Risks to workers also can be controlled by using safety procedures and protective equipment.

Short-term risks associated with Alternative 4 would be the greatest because of its larger transportation component (both contaminated soil and clean backfill need to be transported from and to the site). The short-term risks are expected to be the lowest for the biocell construction and operation.

This Early Action will be the first of several remedial actions for the site; therefore, one short-term consideration would be whether this action delays or otherwise limits future remedial decision-making. Alternative 2 appears to pose the highest likelihood of confounding future remedial planning because of its longer operational phase. The biocell may also take additional time, beyond the projected five years in the FFS, to reach the remediation goals, and a longer time period may interfere with other remedial planning or with the timely reuse of the property. As discussed above, under Long-Term Effectiveness and Permanence, Alternative 4 poses the plausible scenario of a "clean island" within an area with a long history of industrial use, where a future remedy may need to choose to either to maintain this cleaner zone at high expense, or allow it to be recontaminated.

6. **Implementability**

There are no implementability issues associated with the No Action alternative. Alternatives 2, 3 and 4 are considered implementable from a constructability perspective. Possible challenges common to all three alternatives include the difficulty of installing sheet piles in clayey soils, excavation dewatering and water treatment, phasing cell construction, and uncertainties in the depth to and variability of the native clay layer.

Because of the complexities of the equipment and process, the soil washing technology is expected to have a higher potential for delays associated with equipment problems. Portions of the principal threat LNAPL soils are clays and oily wastes that will pose significant materials handling challenges; therefore, preparation of material for placement in the biocell and for the feed to the soil washing process is critical for both alternatives, although probably more so for the soil washing process. As described in Alternatives 2 and 3, the most highly concentrated areas of the site, where floating product is found, cannot likely be treated through either the biocell or through soil washing, and would need to be transported off site for disposal.

Equipment and specialists are commercially available and sufficiently proven for all three alternatives, although fewer vendors are available for competitive bidding for the soil washing technology.

Alternative 2 would require operation over a longer period (five years of operations are estimated) than Alternatives 3 and 4. The O&M activities needed for this alternative are routine, and failure of a component of the alternative is not expected to result in any significant threats to public health or the environment.

7. **Cost**

The estimated present worth costs of Alternatives 2, 3 and 4 are $17.3 million, $18.4 million and $19.5 million, respectively. There are no costs associated with Alternative 1.

8. **State/Support Agency Acceptance**

The State of New Jersey concurs with EPA's preferred alternative in this Proposed Plan.

9. **Community Acceptance**

Community acceptance of the preferred alternative will be evaluated after the public comment period ends and will be described in the Record of Decision, the document that formalizes the selection of the remedy for the site.

PREFERRED ALTERNATIVE

Based on an evaluation of the various alternatives, EPA and NJDEP recommend Alternative 2, the on-site biocell along with excavation and off-site disposal of the more highly contaminated material, as the preferred alternative to address the principal threat LNAPL. This alternative involves isolating the remedial target areas with sheet pile walls, and excavating the principal threat LNAPL areas, a total of approximately 45,825 cubic yards of material. The more highly contaminated portion of this material, including all liquid LNAPL at a minimum, will be transported off site for disposal. The remaining excavated material would then be augmented with nutrients and bulking agents to enhance permeability and the conditions for biological activity, and the area within the sheet pile walls would be converted into a biocell by installing piping for air and nutrient distribution and a collection system for air and water that may accumulate in the biocell. The augmented LNAPL material would then be placed in the biocell for treatment, and capped.

Operation of the aeration, nutrient distribution, and water collection systems for the biocell would be required for an estimated five-year period. Performance sampling and final confirmation sampling would be conducted to demonstrate that the LNAPL wastes have been destroyed through biological degradation, at which time the biocell components would be dismantled.

In addition to liquid LNAPL, soils with LNAPL concentrations that are found during the remedial design to be unsuitable for treatment in the biocell (based on factors including the effectiveness of the technology to achieve cleanup goals, the projected time period to do so, engineering concerns, etc) would be excavated and treated via stabilization, if needed to allow for transportation, and transported for off-site disposal.

The preferred alternative would achieve the remediation goals that are protective for the principal threat LNAPL, but a subsequent decision is still necessary to address the underlying constituents within this material. Thus, the need for institutional controls, such as a deed notice or covenant, would be determined as part of a future remedy.

The preferred alternative is believed to provide the best balance of trade-offs among the alternatives based on the information available to EPA at this time. EPA believes that the preferred alternative would be protective of human health and the environment, would comply with ARARs, would be cost-effective, and would utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. The selected alternative can change in response to public comment or new information.

Consistent with EPA Region 2's Clean and Green Policy, EPA will evaluate the use of sustainable technologies and practices with respect to any remedial alternative selected for the site.

COMMUNITY PARTICIPATION

EPA encourages the public to gain a more comprehensive understanding of the site and the Superfund activities that have been conducted there.

The dates for the public comment period, the date, location and time of the public meeting, and the locations of the Administrative Record files, are provided on the front page of this Proposed Plan. Written comments on the Proposed Plan should be addressed to the Remedial Project Manager, Grisell V. Díaz-Cotto, at the address below.

EPA Region 2 has designated a public liaison as a point-of-contact for the community concerns and questions about the federal Superfund program in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands. To support this effort, the Agency has established a 24-hour, toll-free number that the public can call to request information, express concerns, or register complaints about Superfund.

For further information on the Diamondhead site, please speak with:

Grisell V. Díaz-Cotto Remedial Project Manager (212) 637-4430	Wanda Ayala Community Relations Coordinator (212) 637-3676

Email: diaz-cotto.grisell@epa.gov

U.S. EPA
290 Broadway 19th Floor
New York, New York 10007-1866

Written comments on this proposed plan should be addressed to Ms. Díaz-Cotto

The public liaison for EPA's Region 2 is:

George H. Zachos
Regional Public Liaison
Toll-free (888) 283-7626
(732) 321-6621

U.S. EPA Region 2
2890 Woodbridge Avenue, MS-211
Edison, New Jersey 08837-3679

Source: Hagstrom Union/Hudson/Essex County Atlas, 1990

Hudson County, Page 5, Grid C-7

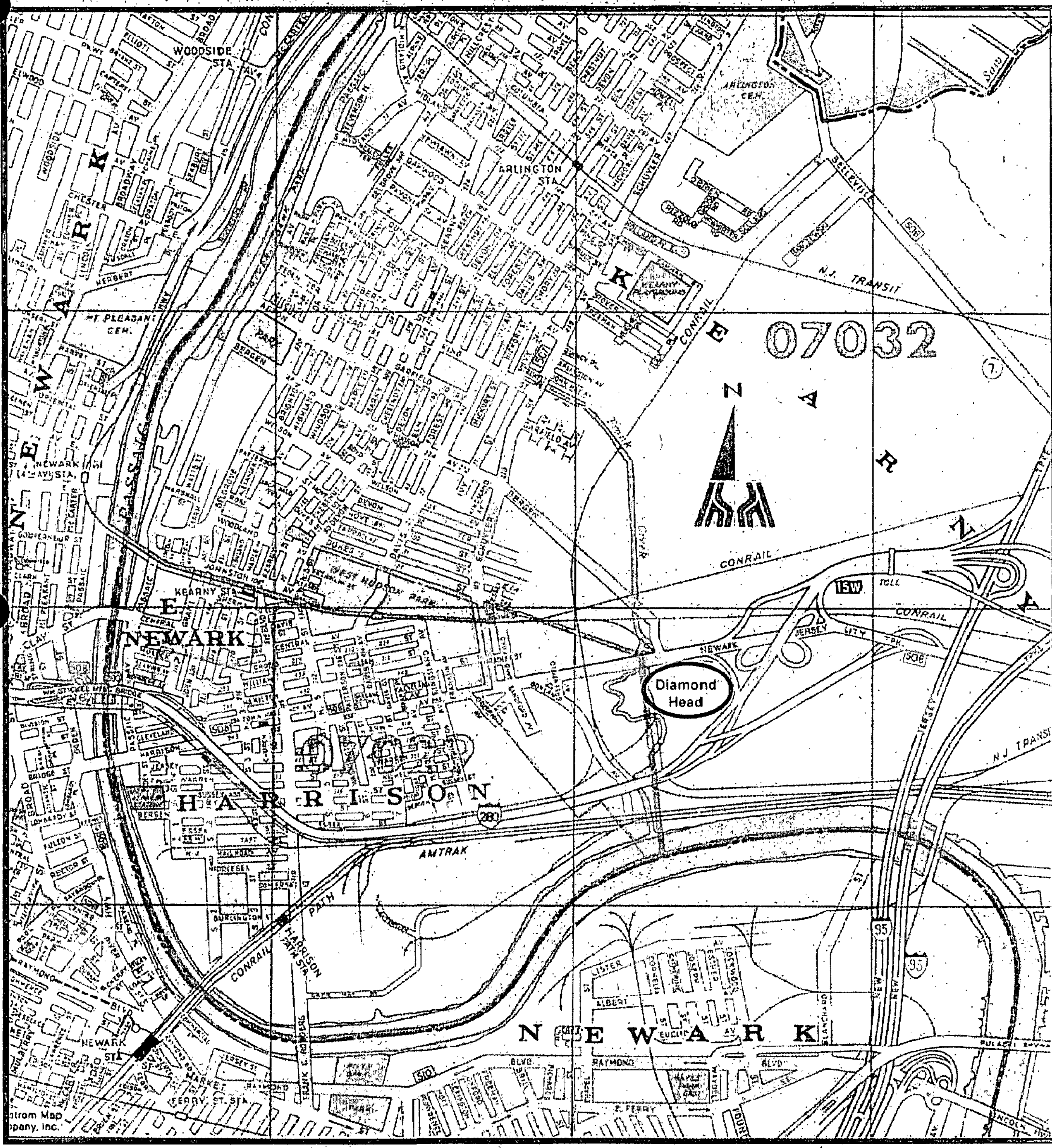
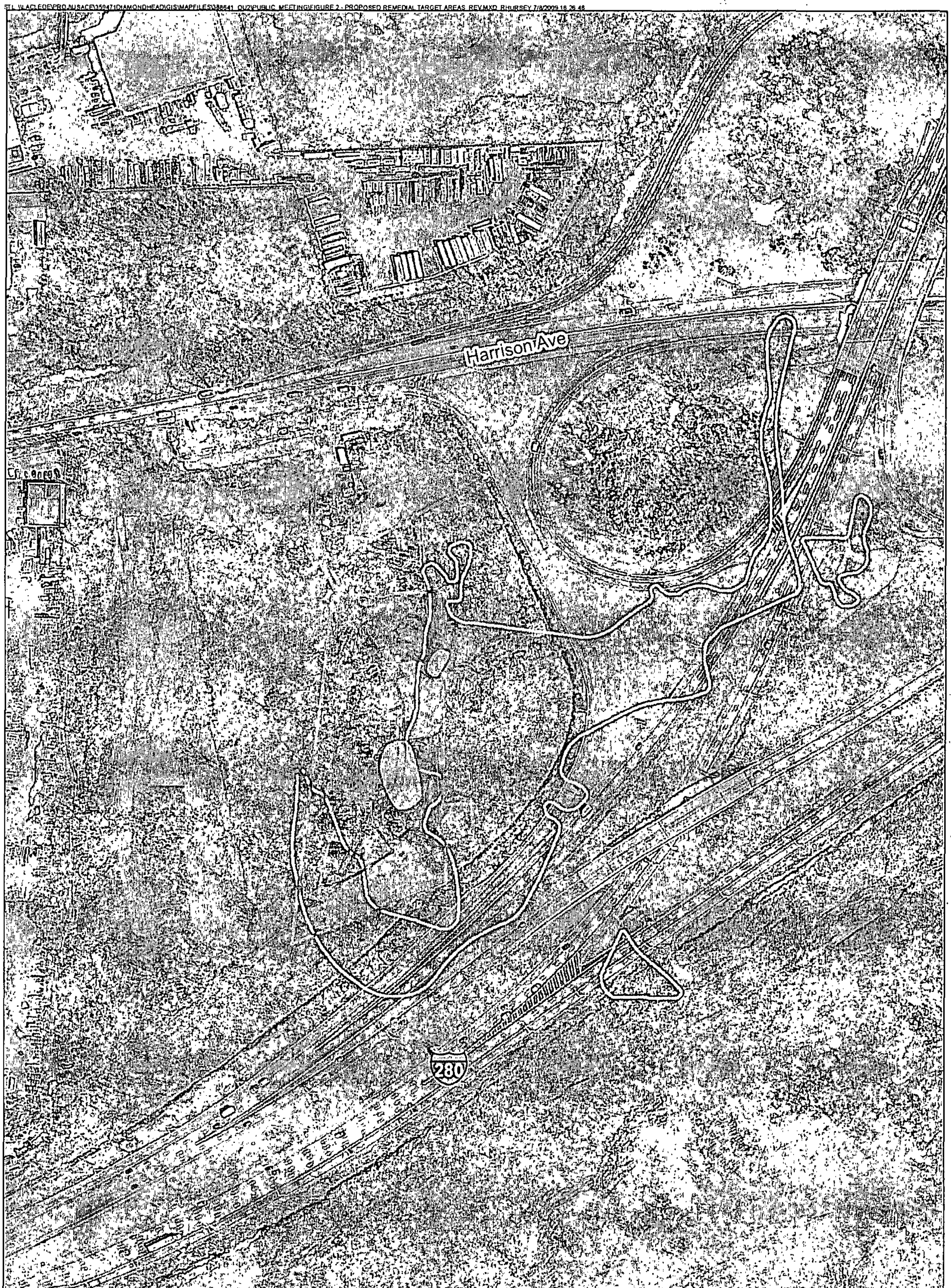


Figure 1 - Diamond Head Oil - Site Location Map
Vacant Lot Adjacent to 1235 Harrison Avenue
Kearny, NJ 07032 (Hudson County)

See Also: USGS 7.5' Quadrangle: Elizabeth, NJ; Photorevised 1981
40° 44' 50" lat., 74° 07' 55.9" long. (NAD 83)

10.00015

STL \\LACLEDE\PROJ\USACE\359471DIAMONDHEAD\GIS\MAPFILES\388641_OU2\PUBLIC_MEETING\FIGURE 2 - PROPOSED REMEDIAL TARGET AREAS REV.MXD RHURSEY 7/8/2009 16:26:46



Legend
- Temporary Gravel Road
- Proposed Remedial Target Area
- Measureable LNAPL in Wells
- Delineated Wetlands
- Extent of Historical Source Area (1976 Aerial Photo)
- LNAPL Plume

N

0 87.5 175 350 Feet

Figure 2
Proposed Remedial Target Areas
Diamond Head RI/FS
Kearny, NJ

CH2MHILL

10.00016

Table 1
Summary of Chemicals of Potential Concern for the HHRA
Diamond Head RI/FS, Kearny, NJ

Surface Water	Groundwater	Sediment	Surface Soil (0 to 2 feet below ground surface)	Subsurface Soil (2 to 12 feet below ground surface)
Chlorobenzene	Benzene	Benzene	Benzene	Benzene
Chloroethane	Chlorobenzene	Dichlorobenzene-1,4	Ethylbenzene	Bromomethane
Dichlorobenzene-1,4	Chloroethane	Ethylbenzene	Tetrachloroethylene	Carbon tetrachloride
Dichloroethane-1,2	Dichlorobenzene-1,3	Tetrachloroethylene	Trichloroethylene	Chloroform
Dichloroethylene-1,2 cis	Dichlorobenzene-1,4	Trichloroethylene	Xylenes, total	Dibromoethane-1,2
Tetrachloroethylene	Dichloroethene-1,2 trans	Xylenes, total	Acetophenone	Dichlorobenzene-1,3
Trichloroethylene	Dichloroethylene-1,2 cis	Acetophenone	Benzo(a)anthracene	Dichlorobenzene-1,4
Vinyl chloride	Ethylbenzene	Benzo(a)anthracene	Benzo(a)pyrene	Dichloroethane-1,2
Benzo(a)pyrene	Methyl isobutyl ketone (4-methyl-2-pentanone)	Benzo(a)pyrene	Benzo(b)fluoranthene	Dichloroethylene-1,2 cis
Benzo(b)fluoranthene	Tetrachloroethane-1,1,2,2	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Dichloropropane-1,2
BHC, beta	Tetrachloroethylene	Benzo(k)fluoranthene	Dibenzo(a,h)anthracene	Ethylbenzene
BHC, delta	Trichloroethylene	Cresol-p	Indeno(1,2,3-cd)pyrene	Methyl isobutyl ketone (4-methyl-2-pentanone)
Barium	Vinyl chloride	Dibenzo(a,h)anthracene	Methylnaphthalene-2	Tetrachloroethylene
Beryllium	Xylenes, total	Indeno(1,2,3-cd)pyrene	Naphthalene	Trichloroethane-1,1,2
Cadmium	Acetophenone	Methylnaphthalene-2	Aldrin	Trichloroethylene
Chromium	Cresol-o	Naphthalene	BHC, alpha	Vinyl chloride
Iron	Cresol-p	Aldrin	BHC, beta	Xylenes, total
Lead	Cresol-parachloro-meta	BHC, alpha	*Dieldrin*	Acetophenone
Manganese	Dimethylphenol-2,4	DDT-4,4	Heptachlor Epoxide	Benzo(a)anthracene
Thallium	Ether, bis-chloroisopropyl	Dieldrin	Pcb-aroclor 1016	Benzo(a)pyrene
	Methylnaphthalene-2	Heptachlor Epoxide	Pcb-aroclor 1242	Benzo(b)fluoranthene
	Naphthalene	Pcb-aroclor 1242	Pcb-aroclor 1248	Benzo(k)fluoranthene
	Nitrophenol-4	Pcb-aroclor 1248	Pcb-aroclor 1260	Dibenzo(a,h)anthracene
	PCP (Pentachlorophenol)	Pcb-aroclor 1260	Aluminum	Indeno(1,2,3-cd)pyrene
	Phenol	Aluminum	Antimony	Methylnaphthalene-2
	Phthalate, bis(2-ethylhexyl) (DEHP)	Antimony	Arsenic	Naphthalene
	Trichlorophenol-2,4,6	Arsenic	Barium	Aldrin
	DDD-4,4	Barium	Cadmium	BHC, alpha
	Dieldrin	Cadmium	Chromium	Dieldrin
	Heptachlor Epoxide	Chromium	Copper	Heptachlor Epoxide
	Aluminum	Copper	Iron	Pcb-aroclor 1016
	Antimony	Iron	Lead	Pcb-aroclor 1242
	Arsenic	Lead	Manganese	Pcb-aroclor 1248
	Barium	Manganese	Mercury	Pcb-aroclor 1254
	Chromium	Mercury	Nickel	Pcb-aroclor 1260
	Lead	Silver	Selenium	Aluminum
	Manganese	Thallium	Silver	Antimony
	Nickel	Vanadium	Thallium	Arsenic
	Selenium	Zinc	Vanadium	Barium
	Thallium		Zinc	Beryllium
	Vanadium			Cadmium
				Chromium
				Copper
				Iron
				Lead
				Manganese
				Mercury
				Nickel
				Selenium
				Silver
				Thallium
				Vanadium
				Zinc